

The endangered Andean bear (*Tremarctos ornatus*) in Ecuador; review and evidences of its conservation state

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1. Introduction

The Andean bear (*Tremarctos ornatus*) (Fig. 1) is endemic to South America and the only one of the sub-continent. It is classified as **Vulnerable** in its whole range, **In Danger** in Ecuador, and listed on Appendix I of CITES. According to IUCN, there are 2.000 individuals in Ecuador, inhabiting in small patches of intact habitat, which in general is fragmented and invaded by humans.

The objective of this essay is to review and assess the state of the Andean bear and its habitat, and the current projects to protect the specie.



Fig. 1: Andean bear.

2. Methodology

From the following sources, I have done a summary of the contents. Scientific articles from: Web of Knowledge. "The IUCN Red List of Threatened Species", "The red book of mammals of Ecuador". I have also done an interview to Santiago Molina, Andean bears' expert, and I have talked to Armando Castellanos (Andean Bear Foundation President), who studies Andean bear densities in the northern of Ecuador.

3. Results

3.1 Distributions and population estimations

-Distribution (Fig. 2): Andes, from 250 to 4.750m, from cloud forests to paramos.

-In Ecuador: in the Andes, foothills and into subtropical and templates forests. Largest populations are in Protected areas (PAs).



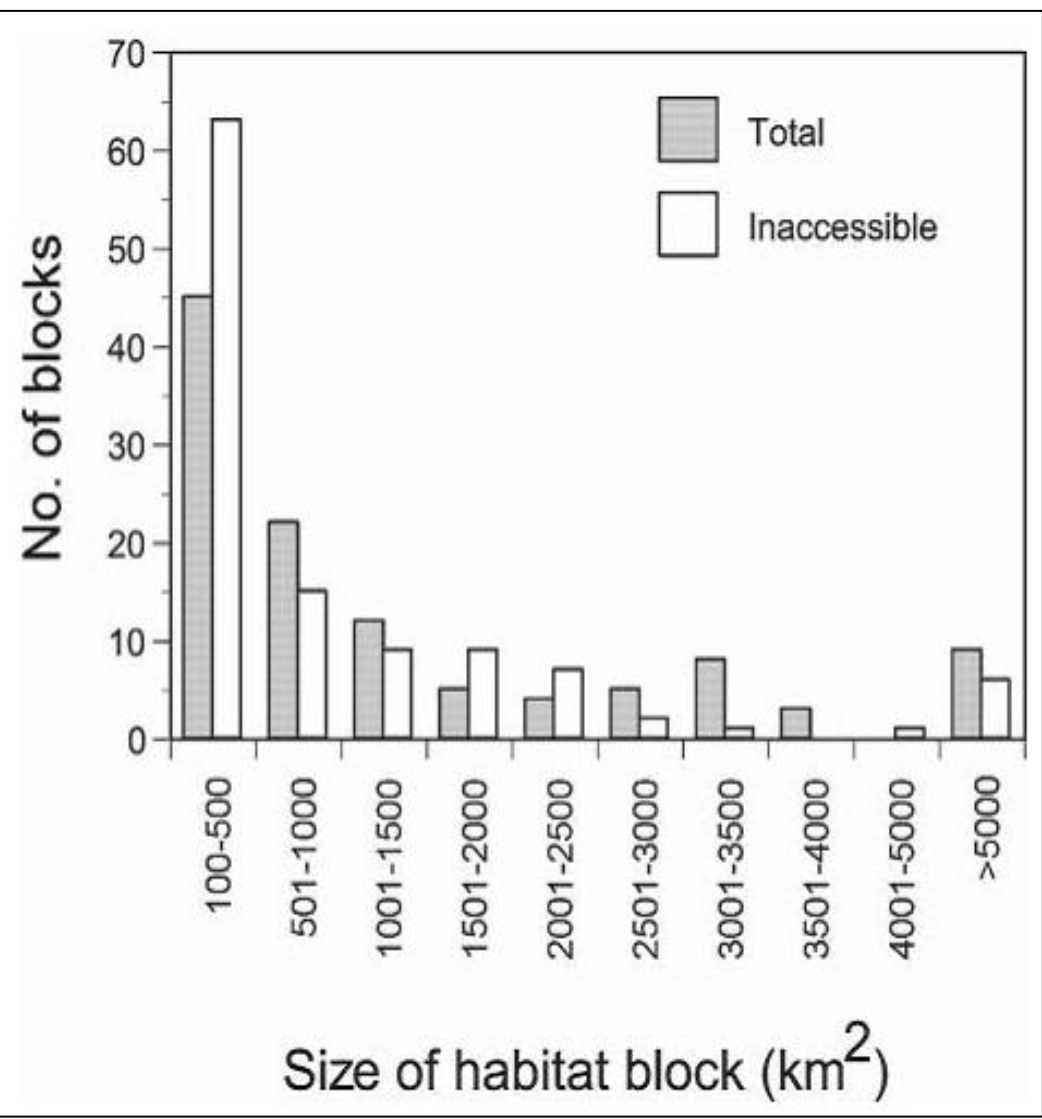
Fig. 2: In red: Andean bear distribution.

-The following table shows the most important studies of populations size:

Date	Estimations
1999	> 18.250 individuals in the whole habitat. - Largest Andean bear populations in Cayambe Coca ¹ and Sangay ² National Parks (Fig. 4).
2003	>25.000 individuals in the whole range habitat. Populations genetically poor (ancestral condition). No bottle neck effect.
2004	9 bears identified and 4.4 bears/100km ² estimated in the Intag region ³ , with territories from 15km ² to 126km ² (Fig. 4).
2010	10 bears identified in a private area in Sangay National Park ² (Fig. 4).
2011	<2500 bears in Ecuador
2013	- 18 bears in Intag region, sub-estimations of bear populations? -Populations are genetically poor and isolated in small patches. In the worst of the cases, endogamy is taking place.

3.2 Habitat state

Date	Habitat data
2003	Habitat range in Ecuador: 58.000km ² . Just 19.000km ² included in Protected Areas (Fig. 4), which are 58.
2004	Actual habitat range→40% (Fig. 4) of the original, is severely fragmented (Fig. 3). Annual rate of habitat lost: 2-4%.



• 42% of habitat patches <100km², 40% <500km², and just a 9% >5.000km² (Fig. 3)

Additionally, most of the patches are inhabited by humans → habitat quality is reduced.

Fig. 3: Frequency distribution of number of bear's habitat blocks in different size classes.

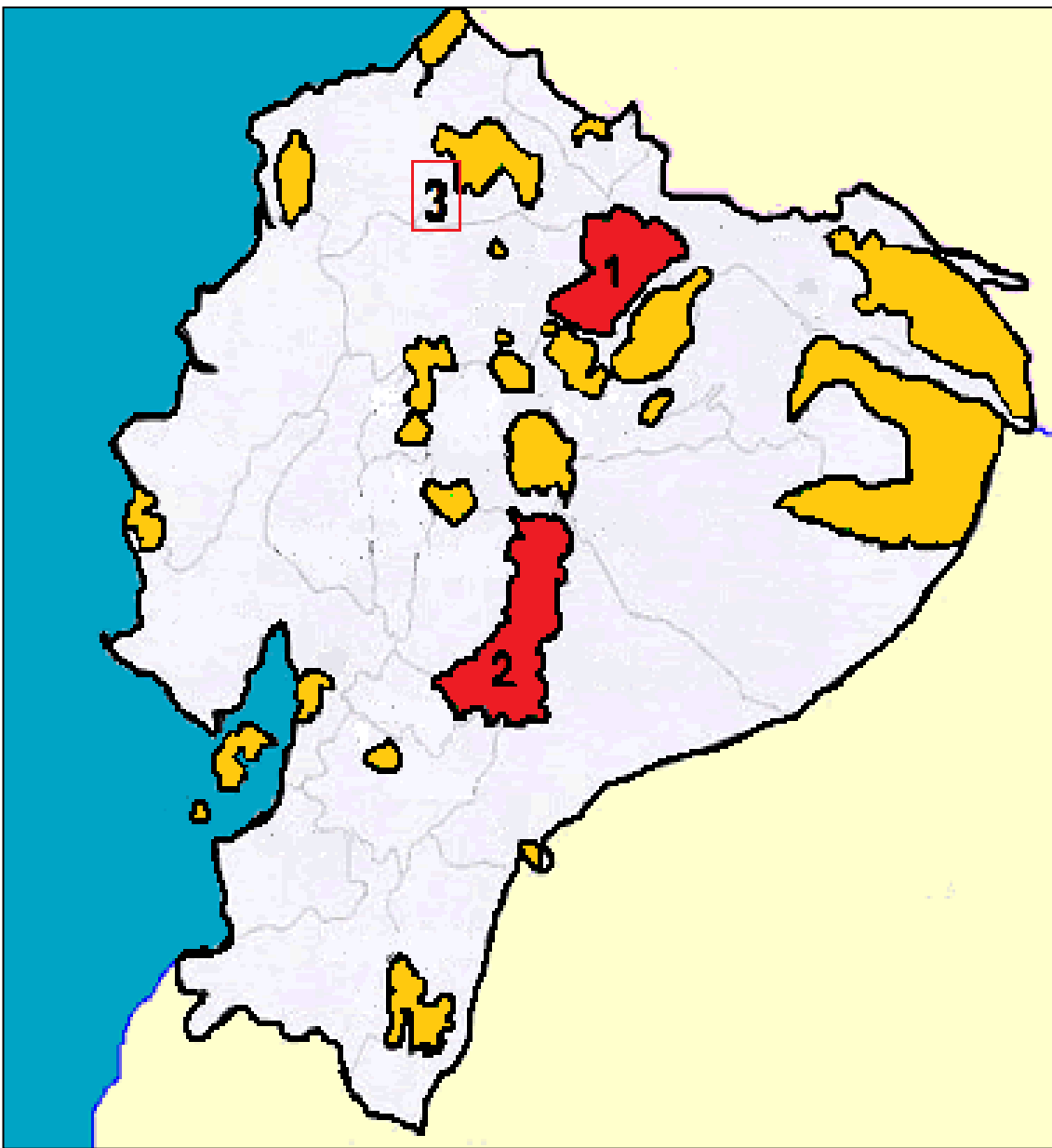


Fig. 4: Map of PAs of Ecuador. 1: Cayambe Coca. 2: Sangay. 3: Intag Region.

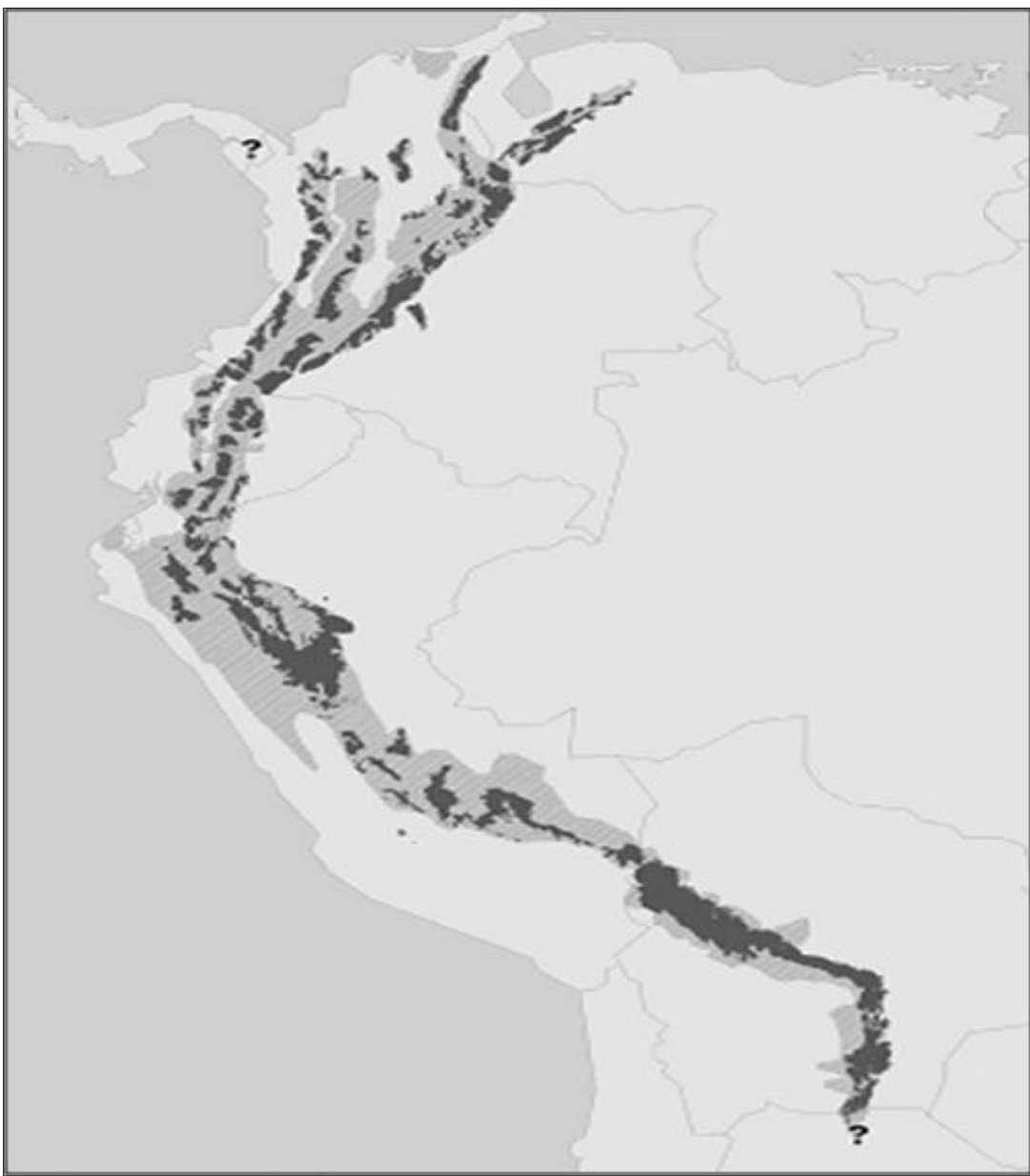


Fig. 5: Territory historically occupied by Andean bears (light grey) and the territory they occupy nowadays (dark grey).

3.3 Main threats

Threats	Explanations
Habitat lost	Degradation, deforestation and fragmentation due to agriculture expansion, road construction and oil exploitation. Consequences: populations isolated in small patches. The largest patches are in the east of the country, while the smallest are in the north.
Human conflict	Bears destroy corn fields or kill the deer, and they are killed by local farmers. Bears are also hunted. Lots of individuals are captured for illegal traffic
Lack of knowledge	Bear populations distribution is not clear, as well as its state.
Policy disinterest	In Ecuador, the Andean bear is legally protected, but the law is not usually enforced, and the offenders are not punished.
Other factors	Extant populations are small, increasing the probability of endogamy. Reproduction rates are low, with long parental care.

• Based on rates and lost of habitat extensions, poaching and other threats, it is said that the Andean bear populations have been reduced in a 25% in the last generation.

3.4 Current projects

Who and when	Project
Since 1995, A. Castellanos	16 individuals released, one in 2012 and four waiting to be released in 2013.
1998-2003, EcoCiencia	A bear education program was developed for a Quichua indigenous community, which ended with no positive results.
Since 2008, "Don Oso" Group	Identification of individuals. In 2011 published " <i>Don Oso visita mi escuela</i> ", which works with Maths, Geography and Literature while teaches environmental ethic and conservation to children.
2010, Ministry of environment	Strategy for the conservation of the Andean bears.
2013, S. Molina	Construction of a corridor to connect bear populations in a 60.000ha territory.
2013, Foundation Eco-Volunteer UP	Reforestation a 2.500ha area in the north of the Andean bear habitat range.

4. Conclusions

The state of the Andean bear is critical due to humans: they are killing the bear for any reason and destroying and invading its habitat, leading the bear to extinction. Research efforts are not enough, the government is not involved enough, and education programs do not give positive results. Protection plans, management, and the implication of the general public inhabiting the bear's habitat are required. Thus, it is necessary to know the exact distribution of the bear along its habitat range to reduce fragmentation effects, establish more protected areas, unify them through corridors and keep on raising awareness among the people in order to efficiently protect the Andean bear.